

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)  
(PCT Article 36 and Rule 70)

REC'D 15 NOV 2005

WIPO

Applicant's or agent's file reference 123884x326/56 SC	<b>FOR FURTHER ACTION</b>	See Form PCT/IPEA/416
International application No. <b>PCT/NZ2004/000167</b>	International filing date ( <i>day/month/year</i> ) 27 July 2004	Priority date ( <i>day/month/year</i> ) 28 July 2003
International Patent Classification (IPC) or national classification and IPC  Int. Cl. <sup>7</sup> G06F 17/50		
Applicant  THE UNIVERSITY OF WAIKATO et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
  - a. ☒ (sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:
    - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
    - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
  - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 23 February 2005	Date of completion of the report 31 October 2005 <span style="float: right;">8 NOV 2005</span>
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  <b>MATTHEW HOLLINGWORTH</b> Telephone No. (02) 6283 2024

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NZ2004/000167

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1 (b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages **1-21** as originally filed/furnished
- pages\* received by this Authority on with the letter of
- pages\* received by this Authority on with the letter of
- ☒ the claims:
- pages as originally filed/furnished
- pages\* as amended (together with any statement) under Article 19
- pages\* **22-26** received by this Authority on **23 September 2005** with the letter of **19 September 2005**
- pages\* received by this Authority on with the letter of
- ☒ the drawings:
- pages **1** as originally filed/furnished
- pages\* received by this Authority on with the letter of
- pages\* received by this Authority on with the letter of
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to the sequence listing (*specify*):

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/NZ2004/000167

**Box No. V** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims 1-28	YES
	Claims	NO
Inventive step (IS)	Claims 1-28	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-28	YES
	Claims	NO

## 2. Citations and explanations (Rule 70.7)

- D1: WO 2001/008054 A2 (RAYTHEON COMPANY), 1 February 2001

The above document represents the closest available prior art, and does not anticipate the claimed invention. In particular, the use of a user-selectable range of attribute values distinguishes the claims from this citation.

WHAT I/WE CLAIM IS:

1. Computer software for modelling the energy consumption of at least one process said at least one process using a plurality of resource streams, with each resource stream having at least one operational attribute, said software being adapted to execute the steps of:
  - (i) receiving at least one set of a range of attribute values for at least one attribute of at least one resource stream used by the process, wherein said received set of a range of attribute values is received from a user for said at least one operational attribute, and
  - (ii) calculating at least one energy consumption value for the process using said received range or ranges of attribute values.
2. Computer software as claimed in claim 1 wherein said software is adapted to execute the further preliminary step of identifying all resource streams used within the process to be modelled.
3. Computer software as claimed in either claim 1 or claim 2 wherein said software is adapted to execute the additional preliminary step of identifying all operational attributes of resource streams used within the process which affect the energy consumption of the process.
4. Computer software as claimed in any previous claim wherein said software is adapted to execute the further additional subsequent step of indicating the specific attribute value or values from the range or ranges supplied which result in the energy consumption value or values calculated.

5. Computer software as claimed in any previous claim wherein the energy consumed by the process modelled is used to heat or cool at least one material.
6. Computer software as claimed in any previous claim wherein the software provided is adapted to calculate the total energy used to heat resource streams.
7. Computer software as claimed in any previous claim wherein the software provided is adapted to calculate the total energy used to cool resource streams.
8. Computer software as claimed in any previous claim wherein the software employed calculates the total global minimum energy consumed by a process
9. Computer software as claimed in any previous claim wherein the software employed calculates the total global maximum energy consumed by a process.
10. Computer software as claimed in any previous claim wherein the software provided is adapted to optimise energy consumption characteristics of a process.
11. Computer software as claimed in claim 10 wherein the software provided indicates a specific optimised set of operational attributes or operational attribute values.
12. Computer software as claimed in any previous claim wherein the software provided calculates an energy consumption value once it receives data associated with a new resource stream.

13. Computer software as claimed in any previous claim wherein a resource stream consists of a flow of material.
14. Computer software as claimed in any previous claim wherein an operational attribute is associated with a characteristic of a resource stream which has an affect of energy consumed by the process model.
15. Computer software as claimed in any previous claim wherein an operational attribute is the temperature of a flow of material.
16. Computer software as claimed in any previous claim wherein the software tracks all resource streams and all associated operational attributes of said resource streams which have an affect on the energy consumption of the process model.
17. Computer software as claimed in any one of claims 1 to 15 wherein the software provided tracks selected resource streams and/or selected operational attributes of said resource streams to provide an approximate model of the process involved.
18. Computer software as claimed in any previous claim wherein a single set of a range of attribute values indicates an allowable range of values for an operational attribute.
19. Computer software as claimed in any previous claim wherein a single set of a range of attribute values are received from a user for each operational attribute.
20. A method of modelling the energy consumption of at least one process, said at least one process using a plurality of resource streams, with each resource

stream having at least one operational attribute, said method being implemented through the steps of:

- (i) receiving at least one set of a range of attribute values for at least one attribute of at least one resource stream used by the process, and
  - (ii) calculating at least one energy consumption value for the process using said received range or ranges of attribute values.
21. Computer readable media storing computer software for modelling the energy consumption of at least one process as claimed in any one of claims 1 to 19.
22. An energy consumption modelling system provided through a computer system programmed with computer software as claimed in any one of claims 1 to 19
23. A method of calculating global minimum heat energy utility and global minimum cooling energy utility for at least one process, said at least one process using a plurality of resource streams, with each resource stream having a temperature, said method executing the steps of;
- i) shifting resource stream temperature values up or down by half of the minimum temperature difference between hot and cold resource streams, and
  - ii) sorting the resource streams into a number of consecutively ordered temperature steps, and
  - iii) for each temperature step other than an external energy utility temperature step, calculating energy surplus values and energy output values for each step, and

- iv) using said calculated energy surplus values and energy output values for calculating global minimum heating energy utility and global minimum cooling energy utility.
- 24. A method as claimed in claims 23 wherein two energy surplus values, Qs (low\_surplus) and Qs (high\_surplus) are calculated for each step.
- 25. A method as claimed in claims 23 or 24 wherein two energy output values, Qs (low\_output) and Qs (high\_output) are calculated for each step.
- 26. An energy consumption modelling system substantially as herein described with reference to and as illustrated by the accompanying drawings and/or examples.
- 27. Computer software for modelling the energy consumption of at least one process substantially as herein described with reference to and as illustrated by the accompanying drawings and/or examples.
- 28. A method of modelling the energy consumption of at least one process substantially as herein described with reference to and as illustrated by the accompanying drawings and/or examples.